

EFFECT OF ANTHROPOGENIC SULFATE ON CLOUD DROP NUMBER CONCENTRATION. Catherine C. Chuang and Joyce E. Penner, Atmospheric Science Division, Lawrence Livermore National Laboratory, Livermore, CA 94551.

The number concentration of cloud drops are initially determined by the aerosol particles that serve as cloud condensation nuclei (CCN) and the updraft velocity. Chemical reactions of the emitted gaseous sulfur compounds due to human activities will alter, through gas-to-particle conversion, the aerosol size distribution, total number, and its chemical composition. In this study, our focus is to develop a means for relating the predicted anthropogenic sulfate mass to cloud drop number concentration over the range of expected conditions associated with continental and marine aerosols. We start with an assumed pre-existing particle size distribution and develop an approximation of the altered distribution after addition of anthropogenic sulfate. We thereby develop a conservative estimate of the possible change in cloud drop number concentration due to anthropogenic sulfate. The results are used to estimate the possible change in cloud optical thickness and cloud albedo due to an increase of anthropogenic sulfate mass concentration. This work is aimed at improving the assessment of the effects of anthropogenic sulfate on cloud optical properties and the global radiation budget.

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